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10/590,029

08/18/2006

Kenji Sato

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EXAMINER

HAGAN, SEAN P

ART UNIT

PAPER NUMBER

2828

MAIL DATE

DELIVERY MODE

02/13/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/590,029 | SATO ET AL. | |
| | Examiner | Art Unit | |
| | SEAN HAGAN | 2828 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 November 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 August 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>18 August 2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1 through 11 originally presented for examination. Claims 1 through 11 canceled by preliminary amendment 18 August 2006. Claims 12 through 21 added by preliminary amendment 18 August 2006. Claim 21 cancelled by amendment received 26 November 2007. Claims 12 through 20 are pending in this application.

Drawings

2. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. Claims 12 through 14 and 16 through 20 rejected under 35 U.S.C. 103(a) as being unpatentable over Tamura et al. ("Ultrafast electroabsorption modulators with traveling-wave electrodes", Lasers and Electro-Optics Society, 2001. LEOS 2001. The 14th Annual Meeting of the IEEE, Vol. 1, 12-13 Nov. 2001 pp. 97-98, hereafter Tamura) in view of Ledentsov et al. (Ledentsov, US Patent 2003/0206741).

5. **Regarding claim 12**, Tamura discloses, "A semiconductor laser and an electroabsorption optical modulator are integrated on a high-resistance semiconductor substrate" (pg. 97, col. 2, last paragraph starting "A schematic diagram..."). "Wherein said electroabsorption optical modulator has a pair of electrodes arranged on one surface of said high-resistance semiconductor substrate and a prescribed bias voltage is applied to said electrodes" (pg. 97, col. 2, last paragraph starting "A schematic diagram..."). "Said electroabsorption optical modulator is of a configuration that satisfies a condition $L \times B \geq 2000 \mu\text{m} \times \text{Gb/s}$ where L is a length of said electroabsorption optical modulator and B is an operating frequency" (pg. 97, col. 2, first full paragraph starting "modulation bandwidth of..."). "An absorption peak wavelength of said electroabsorption optical modulator being shorter than an oscillation wavelength of said semiconductor laser" (pg. 97, col. 1, last paragraph starting "This device has..."). Tamura does not disclose, "The energy conversion value ΔX of a detuning amount, which is the difference between said oscillation wavelength and said absorption peak wavelength at room temperature, satisfies a condition $40 \text{ meV} \leq \Delta X \leq 100 \text{ meV}$."

6.

7. Ledentsov discloses, "The energy conversion value ΔX of a detuning amount, which is the difference between said oscillation wavelength and said absorption peak wavelength at room temperature, satisfies a condition $40 \text{ meV} \leq \Delta X \leq 100 \text{ meV}$ " (p. [0140]). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Tamura with the teachings of Ledentsov. Detuning amounts presented as reasonable by Ledentsov would have been suitable for use with the invention of Tamura. The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

8. **Regarding claim 13**, the combination of Tamura and Ledentsov does not disclose, "Wherein said prescribed bias voltage applied at a minimum operating temperature is 1 V or less." It would have been obvious to one of ordinary skill in the art at the time of invention to select the most preferable driving voltage, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

9. **Regarding claim 14**, Tamura discloses, "Wherein said pair of electrodes are a P-type electrode and an N-type electrode" (pg. 97, col. 2, last paragraph starting "A schematic diagram..."). The combination of Tamura and Ledentsov does not disclose,

"Said P-type electrode is a traveling-wave electrode." It would have been obvious to one of ordinary skill in the art at the time of invention to set desired traveling electrode as p-type, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

10. **Regarding claim 16**, Tamura discloses, "Wherein active layers of said semiconductor laser and said electroabsorption optical modulator are composed of layers buried by a semiconductor or a dielectric" (Fig. 2).

11. **Regarding claim 17**, the combination of Tamura and Ledentsov does not disclose, "Wherein said buried layers are undoped layers." It would have been obvious to one of ordinary skill in the art at the time of invention to provide undoped barrier layers, since it was known in the art that barrier layers may be provided undoped.

12. **Regarding claim 18**, Tamura discloses, "Wherein quantum wells of an active layer of said semiconductor laser and quantum wells of an active layer of said electroabsorption optical modulator are joined by a butt joint" (pg. 97, col. 2, last paragraph starting "A schematic diagram...").

13. **Regarding claim 19**, Tamura discloses, "Wherein the quantum wells of said electroabsorption optical modulator are of a structure wherein an energy level of a

conductive band of wells is higher than an energy level of a conductive band of the barriers" (pg. 97, col. 2, last paragraph starting "A schematic diagram..."). "An energy level of a valence band of the wells is higher than an energy level of a valence band of the barriers" (pg. 97, col. 2, last paragraph starting "A schematic diagram...").

14. **Regarding claim 20**, Tamura discloses, "Wherein aluminum is contained in a composition of the active layer of said electroabsorption optical modulator" (pg. 97, col. 2, last paragraph starting "A schematic diagram...").

15. Claim 15 rejected under 35 U.S.C. 103(a) as being unpatentable over Tamura in view of Ledentsov and further in view of Kamioka et al. (Kamioka, JP Patent 2001-024289).

16. **Regarding claim 15**, the combination of Tamura and Ledentsov does not disclose, "Wherein an active layer of said electroabsorption optical modulator has an undoped layer." "A thickness of said undoped layer gradually decreases with progression in a direction of progression of oscillation light from said semiconductor laser." Kamioka discloses, "Wherein an active layer of said electroabsorption optical modulator has an undoped layer" (abstract). "A thickness of said undoped layer gradually decreases with progression in a direction of progression of oscillation light from said semiconductor laser" (abstract). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of the

combination of Tamura and Ledentsov with the teachings of Kamioka. Introduction of specific modulator design of Kamioka would enhance the teachings of Tamura and Ledentsov by prolonging the lifetime of the modulator part.

Conclusion

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to SEAN HAGAN whose telephone number is (571)270-1242. The examiner can normally be reached on Monday-Friday 7:30 - 5:00.

18. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun O. Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

19. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/S. H./
Examiner, Art Unit 2828

/Minsun Harvey/
Supervisory Patent Examiner, Art Unit 2828